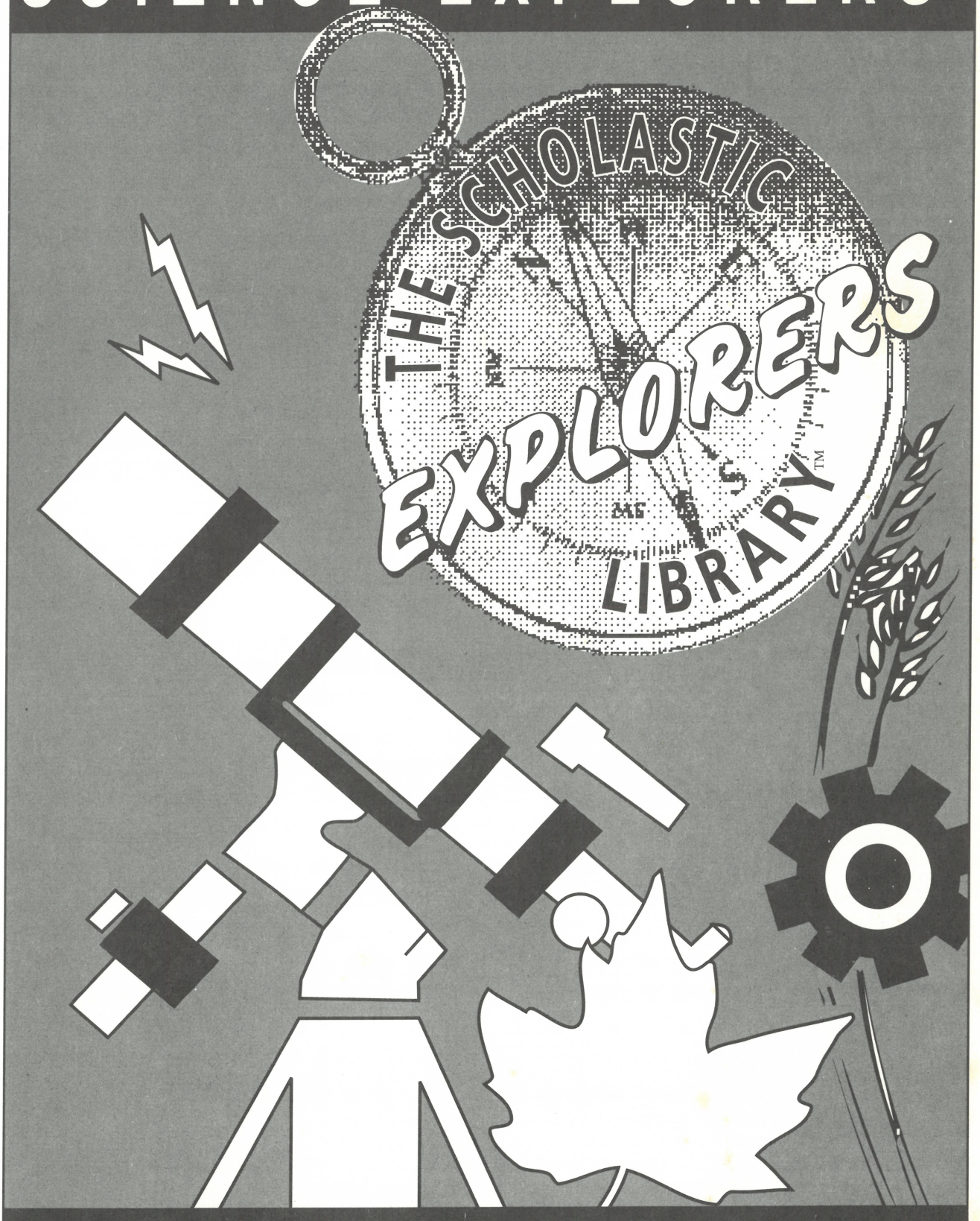
SCIENCE EXPLORERS™



VOLUME 1 • GRADES 1-3

Plants • Weather • Shadows • Skeletons

SCHOLASTIC

SCHOLASTIC EXPLORERS LIBRARY

SCIENCE EXPLORERS

Volume One

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ISBN: 0-590-84058-4

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WELCOME TO *SCIENCE EXPLORERS*

Welcome to the Scholastic *Science Explorers* Series! Like all programs in the Scholastic Explorers Library, *Science Explorers* approaches learning as a process of discovery guided by the young child's innate curiosity.

Children are natural explorers. They embark daily on journeys of learning launched with simple questions—Why? How? What for? *Science Explorers* provides a complete set of computer-based and hands-on activities that will help students answer many questions about the world. Moreover, these activities will hone the habits of mind that transform curiosity into scientific inquiry.

Each *Science Explorers* unit provides a rich, interactive learning environment that will motivate students to observe their world, ask questions, explore relationships, record observations, make connections, reconceptualize, and ask new questions. In short, the *Science Explorers* series engages children in the world of scientific thinking. It helps them master the scientific problem-solving skills that are essential not only to their success in school science courses, but also to their understanding of the medical, environmental, and technical issues that will inevitably influence their lives.

Your *Science Explorers* package contains four disks, each covering a different topic from the science curriculum. At the heart of each disk is an Exploration, a simulated science experiment that engages children in scientific problem solving. These Explorations familiarize students with scientific logic and the steps of controlled experimentation. They are structured so that students can perform multiple investigations, testing a different hypothesis each time around. As students conduct their experiments, they:

- Formulate hypotheses.
- Select variables.
- Run trials.
- Measure and record results.
- Analyze results and draw conclusions.

While applying these process skills, students gain insight into significant science concepts: what plants need to grow; how shadows change; how bones grow; how climates differ.

Each disk also contains two highly graphic, interactive Tutorials designed to supplement the Explorations. These optional units can be used to introduce the content area, to provide review for students who need it, or as follow-ups to the Explorations.

Sixteen Explorers' Logs (activity sheets) with corresponding lesson plans, eight At-Home Science activity sheets, and four reproducible glossaries complete the *Science Explorers* package. Twelve of the Explorer's Logs are built around critical science process skills: hypothesizing, classifying, and measuring and recording. The remaining four present cross-curricular activities that integrate science with language arts, social studies, and art. Like the software, the Explorer's Logs encourage students to build on their prior knowledge, apply a variety of critical-thinking skills, collaborate and brainstorm with peers to develop effective problem-solving strategies, and to record and communicate their discoveries.

This Teacher's Handbook is your guide to integrating *Science Explorers* into your classroom and science curriculum. The handbook includes alternative teaching strategies, tips, hands-on activity ideas, the Explorer's Logs and other handouts, as well as information on loading and running the software.

We wish you and your students a world of successful learning adventures!

YOUR *SCIENCE EXPLORERS* PACKAGE

Covering the Curriculum

The *Science Explorers* series is designed to support your science teaching throughout the year. The topics were carefully chosen to span the major strands of the elementary school science curriculum. They cover concepts that are an important part of the established curriculum but are difficult to convey through traditional print media. The four topics covered in this series are:

- Life Science: Plants
- Earth Science: Weather
- Physical Science: Shadows
- Health: Skeletons

These topics were also selected because they cover familiar parts of your students' world. Explorer's Log activity sheets stimulate direct observation and hands-on experimentation that reinforce and expand the understandings students gain from the software.

Although each *Science Explorers* unit focuses on a major branch of the elementary school science curriculum, it can be easily related to a variety of science topics. Alternatively, you can use the programs *independently* of the content covered to focus your students' learning on the process skills embedded in every Exploration. How you use *Science Explorers* depends largely on your own philosophy and approach to teaching science.

The **Subject Correlation Chart** on pages 8 and 9 gives you an at-a-glance guide to what each unit covers.

TEACHING WITH *SCIENCE EXPLORERS*

Science Explorers combines a wide variety of teaching materials:

- Computer simulations that enable students to conduct controlled experiments that would be difficult or impossible in the real world
- Tutorials that present background material in an engaging, interactive format
- Hands-on activities that engage students in real-world experimentation

These materials will enable you to plan a complete unit of study that meets your teaching style and the needs of your class. Keep in mind that there is no single "correct" way to use *Science Explorers*—all the materials have been designed to provide you with maximum flexibility. However, you might find the following ideas helpful as you familiarize yourself with *Science Explorers* and consider how best to use the materials in your classroom.

Using the Software

Each *Science Explorers* disk provides many opportunities for students to answer questions; formulate and test hypotheses; generate, measure, and record data; and draw conclusions. Whether you use these opportunities to challenge individual students, to encourage the group problem solving that is the hallmark of collaborative learning, to provide review for a youngster who is falling behind, or to introduce a new unit of study to your entire class depends on the goals you have set for your students. Before you can determine the most appropriate use of *Science Explorers* in your classroom, you should:

1. Familiarize yourself with the software and the accompanying teaching materials. You will need approximately 45 minutes to review each *Science Explorers* topic (see pp 76-77 for loading instructions). As you review the materials, remember that each Exploration and Tutorial can be used independently.

2. Assess your students' prior knowledge. Students bring an "everyday" understanding of science into the classroom. Their sense of how the world works may be shaped by both surprisingly accurate insights and astonishing misconceptions. Knowing what your students know and believe can help you decide how best to use *Science Explorers*. Classroom discussions are excellent tools for assessing prior knowledge. Interesting conversation starters include vocabulary words, poems or stories, and simple questions, such as "What is a shadow?" "What makes the weather?" Many teachers find that they are best able to elicit their students' knowledge when they play a *minimal* role in the discussion, letting students direct the conversation themselves.

3. Assess your computer resources. Clearly, the amount of computer time available will affect how you use *Science Explorers*. If time is limited, use Tutorials for whole-class presentations.The many questions in each Tutorial make excellent discussion points. The Explorations are especially appropriate for group work. By carefully teaming students with complementary strengths, you can enhance the learning experience for all.

4. Consider your broader learning objectives. If enhancing your students' skills in communication, problem solving, and decision making is one of your priorities, consider assigning *Science Explorers* Explorations as small-group activities. Explorations are an ideal stimulus for collaborative learning because they require students to make numerous decisions. Divide your class into Explorer Teams. Have each team assign members individual roles (e.g., notetaker, referee to resolve conflicting points of view, computer operator), but stress that students must reach consensus in order to proceed through the Exploration. Have each team report on its findings. Such an approach can develop group problem-solving skills *and* individual responsibility.

   You might also consider dividing your class into pairs of "Science Partners" who can stimulate each other's learning as they work through a Tutorial or Exploration together. All students can benefit from the reinforcement and self-help that come with collaborative learning.

5. Discuss the idea of simulations. Before you use any of the Explorations, be sure that your students understand that these are simulations. Discuss other types of simulations your students may be familiar with (e.g., fire or earthquake drills; TV "docudramas" that recreate past events). Ask them whether they think scientists use computer simulations in their work and why. Help your students understand that a simulation represents a very narrow piece of reality. Encourage them to consider, for example, how the results of making plants grow or measuring bones in the real world might differ from results generated by the computer simulation.

6. Discuss what it means to be an explorer. However you use these programs in your classroom, consider introducing the software through a class discussion of what it means to be an explorer and a scientist. Can your students name any explorers? Any scientists? What skills do they think are necessary to be a scientist or an explorer? Are these skills your students have? Are they skills they can learn? Encourage students to consider those attributes that already make them explorers and to use these as they embark on the adventures in learning that *Science Explorers* engenders.

Correlations for Scholastic Science Explorers

CURRICULUM AREA	Recommended for Grades 1-3: Plants	Weather	Shadows	Skeletons	Recommended for Grades 4-6: Animal Adaptations	Day, Night, and the Seasons	Simple Machines	Nutrition
LIFE SCIENCE								
Plants								
Plant Growth	✓	✓						
Plant Structure	✓							
Life Cycle	✓							
Plant Nutrition	✓							
Photosynthesis	✓							
Animals								
Body Structure				✓				✓
Vertebrates				✓				✓
Invertebrates				✓				✓
Animal Growth				✓				✓
Ecology/Evolution								
Plant Ecology	✓	✓						
Animal Ecology		✓			✓			
Habitats	✓	✓			✓	✓		
Evolution					✓			
Adaptation					✓			
Human Biology								
Senses			✓					
Anatomy				✓				✓
Nutrition				✓				✓
EARTH SCIENCE								
Earth								
Earth in Space		✓	✓			✓		
Seasons		✓	✓		✓	✓		
Oceans & Weather		✓				✓		
Day/Night			✓			✓		

Space									
	Sun	✓	✓	✓			✓		
	Seasons		✓	✓			✓		
	Day/Night			✓			✓		
	Solar System		✓				✓		
	Water Cycle			✓			✓		
Weather									
	Seasons		✓	✓		✓	✓		
	Weather Changes		✓	✓			✓		
	Weather Effects	✓		✓		✓	✓		
	Water Cycle			✓			✓		
	Measuring Weather			✓			✓		
	Clouds		✓	✓			✓		
PHYSICAL SCIENCE									
Matter									
	Machines and Work							✓	
	Body Chemicals				✓				✓
	Structure of Matter								✓
	Atoms and Molecules								✓
Energy									
	Light and Shadows	✓	✓	✓			✓		
	Reflections		✓						
	Machines							✓	
	Solar System							✓	
	Light and Earth	✓	✓	✓			✓		
HEALTH					✓				✓
PROCESS SKILLS									
	Experimenting	✓	✓	✓	✓	✓	✓	✓	✓
	Hypothesizing	✓	✓	✓	✓	✓	✓	✓	✓
	Observing	✓	✓	✓	✓	✓	✓	✓	
	Classifying	✓	✓	✓	✓				
	Measuring	✓	✓	✓	✓	✓	✓	✓	✓
	Modeling		✓			✓	✓	✓	✓
	Concluding	✓	✓	✓	✓	✓	✓	✓	✓
	Analyze					✓	✓	✓	✓

Using the Explorer's Logs

Four Explorer's Logs accompany each disk in your *Science Explorers* package. The logs complement the software by providing activities that extend the concepts taught in the program and by reinforcing the process skills embedded in the computer-based lessons. The set of logs for each subject provides the following support:

- Explorer's Log 1 helps students **formulate hypotheses** and **make predictions** and then **test** them through **hands-on experimentation.**
- Explorer's Log 2 helps students hone their **measurement skills** and provides practice with **recording data.**
- Explorer's Log 3 encourages students to use **classification skills** to better understand phenomena in their world.
- Explorer's Log 4 extends student **knowledge across the curriculum** to content areas such as language arts, social studies, and art.

The lesson plans that accompany the Explorer's Logs offer teacher guidance on how to implement log activities. They also provide alternative teaching strategies and tips, with special emphasis on how **collaborative learning strategies** can be introduced and how the logs can be used successfully with both more and less advanced students. You may want to use the Explorer's Logs as either introductory or follow-up activities to students' work at the computer.

Using the At-Home Science Handouts

Among the recent goals in science education has been the "demystification" of science. Helping students recognize the relevance of science concepts and process skills to the world outside their classrooms is important.

One way to help your students make the connection between their classroom learning and their "real" lives is to send science home. The At-Home Science Handouts in this manual are highly interesting, motivational activities that challenge students to apply the process skills they learn in class to home-based explorations. These activities are also designed to encourage parents' involvement in their children's science education.

Each unit in this *Science Explorers* series includes two At-Home Science Handouts.The hand outs include clear directions so that students can pursue the explorations on their own or with their parents. Assign these handouts as challenges, with the emphasis on the students' fun in exploring rather than on your grading the results.

Using the Glossaries

A reproducible glossary also accompanies each disk in this series. The glossaries provide definitions of all relevant vocabulary used in the program. Students can refer to the glossaries as they use the program. You can also use the glossaries to familiarize students with the vocabulary prior to using the software, to review key terms, or to extend the lesson through language arts activities.

PLANTS

Plants are a familiar part of the young child's world. Children can observe plants growing through cracks in pavement, in a wild meadow, or on windowsills in their classrooms or homes. They can cover seeds with soil and experience the pleasure of watching a tender young plant emerge. Why, then, use a computer to simulate experiments involving plant growth? Because children cannot easily apply a systematic, controlled scientific approach to studying how plants grow in the real world. To do so would take weeks, even years, because plants grow slowly and are affected simultaneously by many environmental factors.

Science Explorers: Plants uses the computer to compress growing time and enable children to vary one environmental influence at a time, thereby helping them focus their observations and understanding of what plants need in order to grow. This exploration has relevance not only to students' understanding of an important part of their world, but also to their future study of science.

Objectives

Students will:

- Know the parts of plants and their functions.
- Understand what plants need to grow.
- Conduct a controlled experiment.
- Investigate the conditions under which a bean plant grows best.
- Analyze the results of an experiment and draw conclusions.

To benefit most from the *Science Explorers: Plants* software, your students should be familiar with:

- Characteristics of living and nonliving things.
- Nutrients.
- Control of variables in scientific experimentation.

Content

The components of your *Science Explorers: Plants* disk are:

Exploration

Plant Explorer Students select a variable (heat, light, or water), and then "grow" a series of four plants, choosing a setting for the selected variable each time. They measure the resulting plants, record their results, and draw conclusions about the conditions that lead to optimal growth. This introduction to controlled, scientific investigation helps students develop science process skills.

Tutorials

Life as a Plant Students learn about the parts of a plant and about similarities and differences among plants. As they do, they build classification and observation skills.

How Plants Grow How do plants get food? What do they need in order to grow well? As children discover the answers to these questions, they make and interpret observations and apply biological concepts.

Ideas for Your Classroom

1. Plant Explorer, the Exploration on this disk, asks students to select one of three variables (light, heat, or water) and test the effects of different amounts of that variable on a plant's growth. This offers an excellent opportunity for you to introduce students to a fundamental principle of controlled experimentation: that all variables except those being tested must be held constant in order for the experiment to produce reliable results. Before your students begin the Exploration, explain what they will be doing. Ask them why they think they will test just one variable at a time. Point out that the computer simulation assumes that all other influences are the same for all plants. Ask them why they think that this is important and what would happen if other variables changed as well.

2. You can further extend this lesson by growing plants in your own classroom. The Explorer's Log I Hands-On Experiment provides a detailed description of one such experiment. Other in-class experiments you might consider include growing one plant in the light and one in the dark, growing plants in different mediums, or subjecting a cactus and a fern to the same amounts of water or light and monitoring their growth. Encourage students to write down their answers to the following questions before they begin an experiment:

   • What is your hypothesis?

   • What variable are you keeping the same for each plant?

   • What are you changing for each plant?

   • How will you keep track of what happens?

3. As you discuss the last question with your students, encourage them to consider how often they should check their plants and record results and how they will know when they have gathered enough information to draw conclusions. Have students design their own Explorer's Logs—recording sheets they can use to track their results. As students conduct their experiments, they might provide progress reports at Explorer Team meetings. Their classmates can act in a "peer review" capacity, suggesting alternative hypotheses and ideas for follow-up experiments. A final report at the end of the project can include written or drawn presentations that can become part of a portfolio of your students' work, which you can use for assessment purposes.

   This activity provides an exceptional opportunity for group work, since the many roles in planning, conducting, monitoring, and reporting on an experiment are sure to activate the talents of a diverse group of students.

4. *Science Explorers: Plants* introduces your students to the things plants need to grow and touches on the vast variation of these needs among different plants. You can extend this lesson further by having each student in your class select and research a different plant. Students should all gather the same information about their plants: How much water do they need? How much light? Where do they grow best? Once students have completed their research, they can employ their classification skills to group their plants by similar characteristics for display on a plant life bulletin board.

5. The study of plant needs can also spawn further science and social studies lessons on habitats: What animals live in deserts? How do people survive in such hot, dry areas? How do deserts in Africa compare to deserts in the United States? Have teams of students imagine a day in the life of a child growing up in the African desert. They can write a story, draw pictures, or act out a play showing what they think it would be like.

EXPLORER'S LOGS

Explorer's Log I: Lesson Plan

Project: Can a New Plant Grow From a Leaf?

Objectives: Students will formulate and test a hypothesis through a hands-on experiment.

Introduction: Students conduct a controlled experiment to determine whether or not new plants can grow from leaves.

Lesson Plan:

1. Use theTutorials on your *Science Explorers: Plants* disk to introduce students to the parts of plants and the factors that contribute to healthy plant growth.
2. Ask your students if they think a new plant can grow from a leaf.
3. Distribute the Explorer's Logs. If students do this activity at school rather than at home, have them work in groups.
4. Review the instructions with your class. Make sure that students understand that they must provide appropriate conditions for plant growth. They must be sure that they are testing whether a new plant can grow from a leaf, not whether a plant can grow without water or soil.
5. When students have completed their experiments, make a chart on the chalkboard comparing their results. Did everyone get a new plant growing from the leaves ? If not, what might have accounted for these differences?
6. Finally, guide your students through a discussion of follow-up experiments they could conduct.

Some sample follow-up experiments:

Try leaves from different types of plants, such as ferns and cacti, and compare the results.

Try growing new plants from other plant parts, such as stems or flowers.

Explorer's Log I: Hands-on Experiment

Experiment: Can a new plant grow from a leaf?

You know that new plants grow from seeds. Can plants also grow from a leaf? Find out!

What You Will Need

- 3 leaf cuttings. A leaf cutting is a leaf with its stem. Choose fresh healthy leaves. Remove them carefully from a plant.
- A pot large enough for all 3 leaves
- Sand, soil, or soilless mix from a garden store
- Water
- A plastic bag big enough to hold the pot
- A stick
- A tie to close the bag

How to Set up the Experiment

1. Fill the pot with sand, soil, or soilless mix.
2. Water the soil. It should be damp.
3. Place the leaves around the rim of the pot. Make sure that the leaf stems are in the soil.
4. Carefully put the pot in the bag.
5. Stand a stick in the center of the pot. The stick will hold up the bag.
6. Close the bag with a tie.
7. Put the pot near a shady window.

Explorer's Log I: Can a new plant grow from a leaf?

Name: _____ Date: _____

MY HYPOTHESIS

I think a new plant _____ grow from a leaf.
(can/cannot)

MY EXPERIMENT

STEP 1: Set up the experiment. Follow the instructions on the front of this sheet.

STEP 2: Look at the cuttings every other day. Do not open the bag or add water. Make observations for two weeks. Record your observations on the chart.

	HOW THE CUTTINGS LOOKED		
DAY	Weaker	The Same	Stronger

STEP 3: Carefully dig up the cuttings. See if they have roots. If they have roots, they are new plants.

MY RESULTS

Did new plants grow from the cuttings? _____

Read your hypothesis. Was it supported? _____

Do you think you would see similar results with other parts of a plant, like its pit or its flower? _____

How could you test this idea? _____

Explorer's Log II: Lesson Plan

Project: How Old Was This Tree?

Objectives: Students will count, measure, and compare tree rings and record their results.

Introduction: Tree rings are a fascinating, visible measure of plant growth. This activity encourages students to think about how trees grow as they practice their measurement skills.

Lesson Plan:

1. Hand out the Explorer's Logs.
2. Explain that the drawing shows the inside of a tree trunk. Ask if anyone knows what the rings of the tree trunk show. Elicit the suggestion that each ring represents one year in a tree's life.
3. Tell students that they can learn a lot about a tree by studying the rings: the age of the tree; when it grew the most; when it grew the least.
4. Challenge students to find the age of the tree in the picture, then to decide how old it was the year that it grew the most and the year it grew the least. (Students will need rulers.)
5 When students have completed the Explorer's Logs, discuss their conclusions. Encourage them to speculate on the factors that influenced the tree's growth in different years.

Some sample follow-up activities:

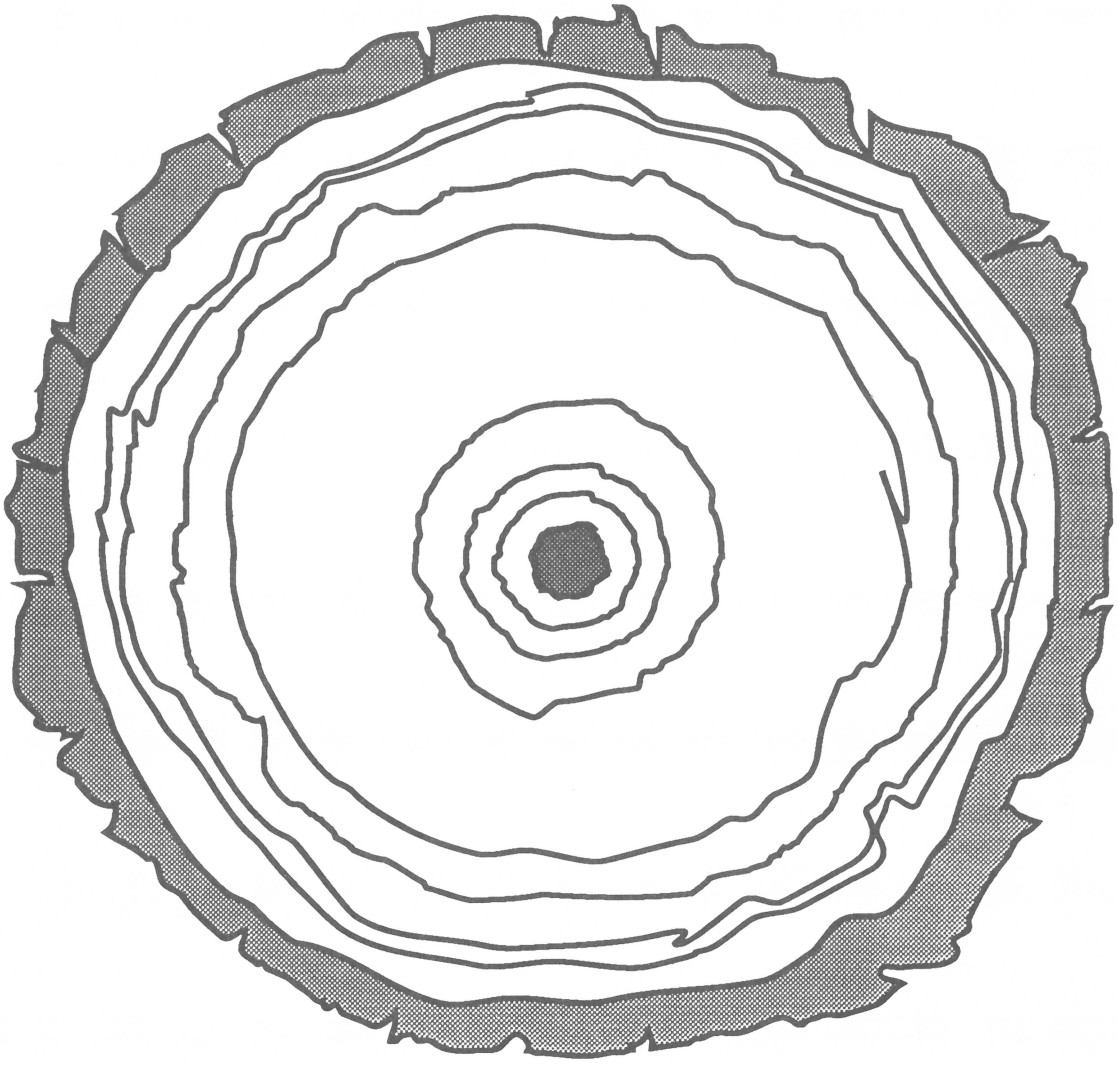
Have students write stories about the life of this tree.

Have students draw pictures of what the tree might have looked like when it was young or when it was chopped down.

Explorer's Log II: How Old Was This Tree?

Name: _____ Date: _____

Count the rings on the tree. Then answer the questions.



1. How old was this tree? _____
2. How wide is the widest ring? _____
3. How old was the tree when it grew the most? _____
4. How old was the tree when it grew the least? _____

Explorer's Log III: Lesson Plan

Project: Classify Leaves

Objectives: Students will apply observation and classification skills as they develop their own classification systems.

Introduction: Students delight in the textures, colors, and shapes of leaves. Encourage them to transform their delight into learning by developing their own classification systems for leaves they collect.

Lesson Plan:

1. Bring two different leaves to class or draw pictures of two leaves on the chalkboard.
2. Ask students how the leaves are alike and how they are different. Students might comment on the leaves' shapes, sizes, or colors (if it is fall).
3. Write students' ideas on the chalkboard.
4. Explain that students can group, or classify, leaves by traits like the ones they named.
5. Hand out the Explorer's Logs. You might also provide students with large pieces of construction paper or oaktag for mounting their leaves.
6. Review the directions for the lesson with your students. Encourage students to pick traits they can use to classify all of the leaves they collect.
7. Create a bulletin board entitled "How We Can Group Leaves" with students' finished work, grouping classification schemes by the traits they used.

Some sample classification traits:

Shape (round, pointy, oval, etc.), size (small, medium, large), number of points, texture (smooth, hairy, rough)

Explorer's Log III: Classify Leaves

Name: _____ Date: _____

Put leaves in groups. The groups should show how the leaves are alike and different.

1. Collect leaves.
2. Think of ways to group the leaves.
3. Write names for each group in the space below.
4. Make a mark for each leaf under the right group name.
5. Copy the group names onto a large piece of paper. Paste the leaves under the right group name.

HOW I CAN GROUP LEAVES

Explorer's Log IV: Lesson Plan

Project: Plant Art

Objectives: Students will create collages with dried beans, seeds, grains, herbs, and spices.

Introduction: Unleash your students' creativity with these colorful and aromatic collages. Students will learn about collage and be reminded of the vast diversity of plant life as they paste dried beans, seeds, grains, herbs, and spices into designs of their own creation.

Lesson Plan:

1. Ask students what they can use to make a picture. (Initial responses will probably include the obvious—pens, crayons, paint, pencils.)
2. Stimulate more creative suggestions by showing students samples of art works that use unconventional medium, such as torn paper, decoupage, dried flower, or yarns, fabric, or other materials.
3. Explain that pictures that use many different materials are called collages.
4. Tell children that plants provide many colorful materials for collages. List one or two examples on the chalkboard (e.g., beans, spices), then solicit suggestions of others from your class.
5. Ask each child to bring in one bag or box of dried beans, grains, spices, or herbs so that the class can make "plant art" collages.
6. Photocopy the Explorer's Logs onto heavy paper.
7. After students have brought in their contributions, hand out the Explorer's Logs, glue, and plant stuffs. Have fun!
8. As a follow-up activity, have your class discuss where their "art supplies" came from: What parts and kinds of plants did they use?

Some sample plant art supplies:

brown rice	orange lentils	kidney beans
sesame seeds	white rice	navy beans
herbs	pumpkin seeds	split peas
cous-cous	spices	

Explorer's Log IV: Plant Art

Name: _____ Date: _____

Use glue and plant art supplies to make a collage or picture.

At-Home Science I

Project: How Big Around?

Have you hugged a tree today? Some trees may be too big to hug. Some may be so small that you can close your fingers around their trunks.

How big around are the trees near your house? Find out!

What You Will Need

- A tape measure
- A pencil
- A friend or adult to help you measure a tree

What to Do

1. Find a tree to measure.
2. Wrap the tape measure around the tree.
3. Have your friend hold the tape measure in place.
4. Write down the measurement.
5. Draw a picture of the tree.

At-Home Science I: How Big Around?

Name: _____ Date: _____

The trunk of my tree measured: _____

This is what the tree looked like:

At-Home Science II

Project: Plant Words at Work

Have you ever **weeded** out your toy box? Have you ever gotten to the **root** of a problem? Does one **branch** of your family live far away?

Weed, root, and branch are plant words. But you can use them to tell about other things. Put plant words to work. Use them to tell a story.

What You Will Need

- A pencil or crayons

What to Do

1. Choose a plant word from the list.
2. Talk to an adult about the word. Talk about how it can be used to tell about something other than plants.
3. Think of a story using your word. Draw or write your story.

Plant Words

root

weed

branch

leaf

stem

trunk

bark

At-Home Science II: Plant Words at Work

Name: _____ Date: _____

My Plant Word: _____

My Story:

GLOSSARY

flower The flower is the part of a plant where seeds form.

habitat The place a plant or animal normally lives is called a habitat.

leaves Green plants make most of their food in their leaves.

nutrients Plants need nutrients to make food.

roots The roots of a plant are under the ground. The roots take water and other nutrients from the soil.

seeds Most new plants grow from seeds.

stem The stem carries water and other nutrients from the roots to the leaves and flowers.

WEATHER

Weather is a major force in every student's life, yet it is one that often remains mysterious. What causes rain? What makes the weather change? What is the weather like in other parts of the world? Such questions intrigue students and open windows onto key earth science concepts.

Science Explorers: Weather uses computer animation and simulation to help students gain insight into weather concepts and their relevance to daily life. The program also presents weather in a global context, thus introducing the concept of climate and providing a foundation for classroom discussions of such pressing environmental issues as global warming and acid rain.

Objectives

Students will:

- Know that air, sun, and water make the weather.
- Understand the difference between weather and climate.
- Identify factors that affect climate.
- Recognize the phases of the water cycle.
- Conduct a controlled experiment to investigate differences in average monthly temperature or rainfall in different places around the world.
- Analyze the results of an experiment and draw conclusions.

To benefit most from the *Science Explorers: Weather* software, your students should be familiar with:

- The globe as a model of the Earth.
- States of matter for water (ice, liquid water, water vapor).
- Control of variables in scientific experimentation.

Content

The components of your *Science Explorers: Weather* disk are:

Exploration

Weather Explorer Students expand their understanding of climatic variation as they systematically compare average rainfall or temperature for four different locations: the Sahara Desert, the Rocky Mountains, the Amazon Rain Forest, and Australia's Nullarbor Plain. Students first decide whether to study temperature or rainfall, then select a time of year and run trials to discover the average daily temperature or average monthly rainfall for the selected month. They record and analyze their data, then draw conclusions about the relative dryness or heat of the four regions.

Tutorials

Weather in Your World Students learn about the major components of weather and apply their understanding to an analysis of local weather conditions.

Weather and Climate Students are introduced to the factors that influence climate. They call on their new knowledge to predict the climate of various places around the world.

Ideas for Your Classroom

1. Weather Explorer, the Exploration on this disk contains eight different experiments: Students can compare the average monthly rainfall or temperature in four regions for any one of four months. This makes the Weather Explorer especially well suited for small group activities. Divide your class into teams and assign each team an experiment. One team might investigate average monthly rainfall in January, while others explore temperature for that month or rainfall for a different month. Since each experiment requires four trials, one for each region, team members can take turns running trials and recording results. Make sure that each team assigns one student to record results on paper. After they have finished their experiments, team members should make charts showing their results. Mount the charts on a bulletin board. Use them to spark further investigation. Some possible questions to investigate: What month is coldest in Australia? Why? Is the temperature in the Sahara Desert always higher than in any of the other places?

2. Students fill in a Today's Weather chart as they work through the first Tutorial, Weather in Your World. You can use a similar chart to expand your students' understanding of climatic differences throughout the United States. Make a paper version of the weather chart that is big enough to accommodate a week of data. Then have students who have friends or relatives in other parts of the country send copies of the chart with a request that the friend record weather data for a specified week, then return the completed chart. Have the class maintain a weather chart for the same week. As the charts come back, have students locate each city or state on a map of the United States. Use different colored push pins to mark and code the locations: red could indicate hotter weather; blue, colder weather; green, wetter weather, etc.

3. *Science Explorers: Weather* introduces the idea that people can affect the weather. Explore this with your class through discussions of technological innovations such as cloud seeding. Consider also the climatic changes that can result from pollution and deforestation. The destruction of the Amazon Rain Forest might be a particularly appropriate topic for research and discussion, since the rain forest is introduced in the program.

4. One sequence in Weather in Your World shows students how clouds and rain are formed. Follow this part of the lesson with a discussion of other forms of precipitation—snow, sleet, hail.

5. Weather and Climate, the second Tutorial, uses an animated globe to introduce four regions of the world with very different climates. Have students find these areas on the classroom globe or map. Then, as a class project for younger children or small group assignments for older ones, read about one of the areas. How do people who live there dress? What do they eat? What types of houses do they live in? What kinds of jobs do they do? Have students write stories about or draw pictures of what it might be like to live in the Sahara Desert, Amazon Rain Forest, Rocky Mountains, or Nullarbor Plain.

EXPLORER'S LOGS

Explorer's Log I: Lesson Plan

Project: Can You Make Rain in a Bottle?

Objectives: Students will formulate and test a hypothesis through a hands-on experiment.

Introduction: In this simple experiment, students reproduce the water cycle in a bottle as they hone their science process skills.

Lesson Plan:

1. Use the Weather in Your World Tutorial to introduce students to the water cycle.
2. Once you are confident that your students understand the water cycle, ask them if they think they can make a model of the water cycle in a bottle.
3. Distribute the Explorer's Logs. If students do this activity at school rather than at home, have them work in groups.
4. Review the instructions with your class. Make sure that students understand the following:
   - How big and where to make the hole
   - That the plastic wrap is used to hold the ice
   - That the light must be positioned so that it does not melt the ice
5. When students have completed their experiments, make a chart on the chalkboard comparing their results. Did everyone get "rain"? How long did different students have to wait before they saw any water form? What might have accounted for these differences?
6. Finally, guide your students through a discussion of follow-up experiments they could conduct.

Some sample follow-up experiments:

Use hot water.

Use cold water.

Use more or less ice.

Explorer's Log I: Hands-on Experiment

Experiment: Can You Make Rain?

Can you make rain in a bottle? Find out!

What You Will Need

- A clean, clear, 2-liter plastic soda bottle with a cap. Soak the bottle in warm water to take off the labels. Dry the bottle.
- About one cup of very warm tap water
- Crushed ice
- Plastic wrap
- A sharp knife
- A bright lamp
- An adult to help you

How to Set up the Experiment

1. Pour the water into the bottle.
2. Put the cap back on the bottle.
3. Ask an adult to cut a hole 3 inches by 2 inches in one side of the soda bottle. The hole should start an inch below the neck of the bottle.
4. Lay the bottle on its side. The hole should face up.
5. Place the plastic wrap over the hole. Push the plastic wrap part way into the hole. It will form a pocket.
6. Put the ice in the pocket.
7. Shine the light on the bottle. The light should shine on the part without ice.

Explorer's Log I: Can You Make Rain?

Name:_____ Date:_____

MY HYPOTHESIS

I think rain _____ form in the bottle.
(will/will not)

MY EXPERIMENT

STEP 1: Set up the experiment. Follow the instructions under How to Set up the Experiment.

STEP 2: Look at the bottle every 10 minutes. Record your observations on the chart.

	WHAT I SAW		
TIME	No Rain	Moisture	Rain

MY RESULTS

Did rain form in the bottle? _____

Read your hypothesis. Did your observations support it? _____

Do you think you would see similar results with very hot water? _____

How could you test this idea? _____

Explorer's Log II: Lesson Plan

Project: Track the Weather

Objectives: Students will record and compare a weather forecaster's predictions and the actual weather for a week.

Introduction: Students, like the rest of us, make decisions based on weather predictions. How accurately does the local forecaster predict the weather? With this activity, students will find out as they build their record-keeping skills.

Lesson Plan:

1. Ask students if they have ever heard a weather forecast. Elicit their opinions about the reliability of forecasts.
2. Tell students that they can see how reliable forecasts are by comparing the forecaster's predictions to the actual weather.
3. Hand out the Explorer's Logs.
4. Review the instructions:
    - Students will listen to the weather forecast and write down the prediction each night for a week.
    - They will record the actual weather for the week.
    - At the end of the week, they will draw conclusions about the accuracy of the forecasts.
5. Discuss your students' results. How often were the forecasts correct? How often were they wrong? What do students think would happen if they tracked forecasts for a month? Would they get the same results? Do they think it is easy or hard to predict the weather accurately? Why?

Some sample follow-up activities:

Have the class invite a local meteorologist to visit.

Arrange a trip to a weather station.

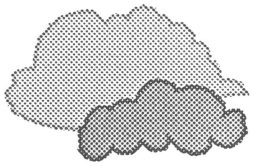
Find books about weather satellites to share with your class.

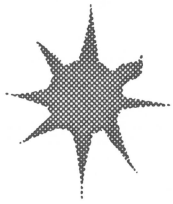
Explorer's Log II: Track the Weather

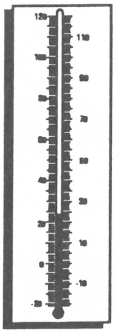
Name: _____ Date: _____

Track the weather. Find out if weather predictions are usually right or wrong.

1. Listen to the weather report every night for one week.
2. Write the predictions on the chart below.
3. Write the actual weather on the chart below.
4. Decide whether the reports were right or wrong.







DATE	WEATHER REPORT	ACTUAL WEATHER

How many weather reports were right? _____

How many weather reports were wrong? _____

Was the weather report usually right? _____

Explorer's Log III: Lesson Plan

Project: Classify Clouds

Objectives: Students will apply observation and classification skills as they develop their own classification systems.

Introduction: Most children enjoy finding shapes in clouds. Turn this child's play into learning with this activity, which challenges students to identify similarities and differences in clouds and to build a classification system based on these similarities and differences.

Lesson Plan:

1. Bring in pictures and/or ask children to bring in pictures of fair weather clouds and rain clouds.
2. Have your class discuss how the clouds are different and how they are alike. Students might comment on the clouds' shapes, sizes, or color.
3. Write students' ideas on the chalkboard.
4. Hand out the Explorer's Logs and review the directions with your students.
5. Set up a cloud-watching schedule for your class. Students might make observations twice a week for two or three weeks, for example. If you do not live in a region with variable weather, use pictures of clouds for this part of the activity.
6. Once students have made their observations, have them develop classification systems.
7. When they have developed their classification systems, have them observe clouds again. This time, they will classify the clouds using their own classification systems.

Some sample follow-up activities:

Introduce students to the classification system meteorologists use for describing clouds.

Discuss how recognizing different types of clouds could help students predict the weather.

Explorer's Log III: Classify Clouds

Name: _____ Date: _____

PART 1: Observe clouds.

List ways in which the clouds are alike and different:

_____

_____

_____

PART 2: Make categories.

Look at your list of cloud traits. Put the traits in categories, such as Color, Size, or Shape.

_____

_____

_____

PART 3: Classify clouds.

Write the names of your groups below. Observe clouds. Make a mark for each cloud next to the right group name.

_____

_____

_____

Explorer's Log IV: Lesson Plan

Project: New Year's Day Around the World

Objective: Students will recognize that climate affects the traditions and activities of people around the world.

Introduction: How might students spend New Year's Day in Sao Paulo, Brazil, or Reykjavik, Iceland? This multidisciplinary, multicultural activity engages your students' imagination as they read about the climate in another country, think about how the climate might affect a New Year's Day celebration, and write essays or draw pictures to express their ideas.

Lesson Plan:

1. Use the Weather Explorer Exploration and Weather and Climate Tutorial to introduce climatic differences around the world.
2. Challenge students to imagine what New Year's Day might be like in the four regions discussed in the software. Elicit students' ideas about the ways in which climate might affect what people do.
3. Ask students, "If you could spend New Year's Day anywhere in the world, where would you go? What might you do there?"
4. Hand out the Explorer's Log. Explain that students will choose a country, learn about its climate and culture, then write a story or draw a picture to show what they might do there on New Year's Day.
5. Have each student select a country to "visit." Use a map of the world to stimulate choices.
6. Ask the school librarian to help students find appropriate materials about their countries.
7. Use students' finished work to create a "New Year's Day Around the World" bulletin board.

Some sample follow-up activities:

Have students write to the United Nations or consulates for more information about their countries.

Adopt a country. Work through its consulate to find a sister school with which to exchange letters.

If students have relatives, neighbors, or friends who emigrated to the United States, they can conduct oral histories and learn first hand what New Year's Day was like in a different culture.

Explorer's Log IV: New Year's Day Around the World

Name: _____ Date: _____

Learn about New Year's Day in another country. Write a story or draw a picture to show what you learned.

_____

My Country:

My Story:

At-Home Science I

Project: Kitchen Clouds

A cloud forms in your kitchen every time water boils. Make a cloud. Then make rain.

What You Will Need

- A cookie sheet
- A teakettle
- Water
- An adult to help you

What to Do

1. Put the cookie sheet in the freezer.
2. Put water in the teakettle.
3. Ask an adult to put the tea kettle on the stove and boil the water.
4. Observe what happens when the water boils.
5. Take the cookie sheet out of the freezer.
6. Ask an adult to hold the cookie sheet above the steam from the kettle.
7. Observe what happens to the steam.

At-Home Science I: Kitchen Clouds

Name: _____ Date: _____

1. What did you see when the water boiled? _____

_____

_____

2. How is the steam like a cloud? _____

_____

3. What happened when the steam touched the cold cookie sheet? _____

_____

_____

At-Home Science II

Project: Weather and You

What do you like to do when it rains? What do you like to do when it snows? Tell how the weather changes what you do.

What You Will Need

- Crayons or a pencil

What to Do

1. Think about what you like to do in different kinds of weather.
2. Write a story or draw a picture to show how the weather changes what you do.

At-Home Science II: Weather and You

Name: _____ Date: _____

This is what I like to do when the weather is:

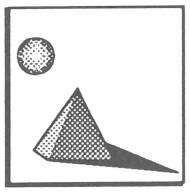
Sunny	**Cold**
Rainy	**Windy**

GLOSSARY

air	Air is the layer of gases around the Earth.
climate	The different kinds of weather that happen in a place make up that place's climate.
desert	Deserts have a hot, dry climate.
evaporate	When water turns into water vapor, it evaporates.
plains	Plains, or grasslands, get rain for only some of the year. Most trees cannot grow on the plains.
rain forest	Rain forests have hot, wet climates all year long.
rain gauge	A rain gauge measures rainfall.
thermometer	A thermometer measures the temperature of the air.
water cycle	In the water cycle, water on the Earth evaporates, forms clouds, and falls back to the Earth over and over again.
water vapor	Water vapor is water in the form of a gas.
weather	The changes that happen in the air around the Earth are called the weather.
wind	Air that is moving is called wind.

SHADOWS

The world of shadows fascinates children and provides an excellent introduction to fundamental concepts of physics. Although students can perform controlled experiments with real light and shadow, they cannot conveniently study changes that occur in the most familiar situations in their world: shadows cast from dawn to dusk, which vary over the course of a year, or the illumination of objects by the rising and setting sun.



Science Explorers: Shadows uses computer simulation to collapse time and thus allow students to explore more systematically how shadows change as the position of the Earth changes over a day or over a year. The program also familiarizes students with the principles of reflection.

Objectives

Students will:

- Understand that light travels in a straight line.
- Understand that some objects reflect light and that these objects create shadows.
- Recognize that a light source, an object, and a surface are necessary to make a shadow.
- Know that shadows change over the course of a day and a year.
- Conduct a controlled experiment to investigate how shadows change over a day or year.
- Analyze the results of the experiment and draw conclusions.

To benefit most from the *Science Explorers: Shadows* software, your students should be familiar with:

- Light as a form of energy.
- The seasons.
- Sunrise and sunset.
- Control of variables in scientific experimentation.

Content

The components of your *Science Explorers: Shadows* disk are:

Exploration

Shadow Explorer As students systematically explore how shadows change over a day or over a year, they apply the science process skills called upon in all *Science Explorer* disks. They generate data; observe, measure, and record results; and draw conclusions. Since this Exploration lets students generate shadows for any time or day or season, they can use it repeatedly to test different hypotheses.

Tutorials

Light and Shadow Students learn the principles of reflection and the elements necessary to make a shadow.

Shadows Change Students discover that shadows change depending on the relative positions of light source and object. They observe on-screen changes in shadows and draw conclusions based on their observations.

Ideas for Your Classroom

1. Through Shadow Explorer, the Exploration on this disk, students can discover how shadows change from sunrise to sunset or with the seasons. Use this Exploration to introduce students to *Science Explorers: Shadows*, then use the Tutorials to reinforce the concepts discovered in the Exploration.

2. The Light and Shadows Tutorial introduces a number of fundamental concepts, including the difference between light sources and nonlight sources. It points out that light travels in a straight line and that most objects stop, or reflect, light. Each of these concepts is worthy of classroom discussion. Consider stopping the Tutorial at the following points and engaging your class in discussion:

- At the "This flashlight is a light source" screen, ask students if they can find any light sources in their classroom.

- At the "Light goes in a straight line" screen, ask students how they could verify this. Elicit the suggestion that they can darken the room, then pass a flashlight around and try shining it on various objects.

- At the "Light bounces off these objects and goes to our eyes" screen, ask if anything else in the picture reflects light. Help students understand that the lamp reflects light even though it is also a light source.

  At this same screen, ask students if they think all objects reflect light. Draw their attention to the windows or other transparent objects in the classroom. Discuss the differences between objects that stop (reflect) light and objects that let light pass through. Consider handing out the first Explorer's Log at this point. The Log challenges students to predict whether or not an object will reflect light and to test their predictions.

3. The second Tutorial, Shadows Change, shows how a girl's shadow changes in length over the course of a day. Draw students' attention to the orientation of the girl and how the shadows were cast. Ask them whether they think the shadows would be the same or different in different geographic locations.(They would be different.)

4. *Science Explorers: Shadows* also introduces students to how shadows change with the seasons. Students might be interested in tracking how their own shadows change over the year. With the help of some markers and large rolls of brown packaging paper, they can. Pairs of students can trace each other's shadows at a designated time and date each month (or each season) for a very personal record of how shadows change.

EXPLORER'S LOGS

Explorer's Log I: Lesson Plan

Project: What Happens to the Light?

Objectives: Students will formulate and test hypotheses through a hands-on experiment.

Introduction: Will light pass through wax paper? Will it reflect off of a desk? A window? A pencil? In this activity, students make and test predictions about whether or not objects will reflect light.

Lesson Plan:

1. Use the Light and Shadows Tutorial to introduce students to reflection.
2. Bring a flashlight, plastic wrap, wax paper, and aluminum foil to school.
3. Show students the plastic wrap, wax paper, and aluminum foil. Ask whether they think all three will reflect light, then test their predictions with the flashlight.
4. Explain that not all objects reflect light. Light passes through some objects, like the plastic wrap and is only partially stopped by other objects, such as the wax paper. If appropriate, tell your students that objects that let light through are called *transparent*; objects that only partially stop light are called *translucent*; objects that completely stop light are called *opaque*.
5. Ask students to bring flashlights to school so that they can experiment finding classroom objects that stop light completely, partially, or not at all.
5. Once students have their flashlights, hand out the Explorer's Logs. Review the directions. Have fun!

Some classroom objects to test:

white writing paper	windows	clear plastic container covers
construction paper	desks	projection screens
mirrors	chalk board	fish tanks

Explorer's Log I: Hands-on Experiment

Experiment: What Happens to the Light?

Will light pass through wax paper? Will it reflect off of a desk? A window? A pencil? Find out!

What You Will Need

- A flashlight
- A variety of objects from around your classroom
- A pen or pencil

How to Set up the Experiment

1. Choose an object.
2. Predict whether or not the object will stop light.
3. Record your prediction.
4. Shine the flashlight on the object to test your prediction.
5. Record the results.

Explorer's Log I: What Happens to the Light?

Name: _____ Date: _____

MY HYPOTHESES

Write the name of the object. Then check what you think will happen.

	WHAT I THINK WILL HAPPEN TO THE LIGHT		
OBJECT	Reflects	Passes Through	In-between

MY EXPERIMENT

STEP 1: Set up the experiment. Follow the instructions under How to Set up the Experiment.

STEP 2: Record your observations on the chart.

	WHAT HAPPENED TO THE LIGHT		
OBJECT	Reflects	Passes Through	In-between

MY RESULTS

Did most objects stop light? _____

Read your hypotheses. How many were supported? _____

Explorer's Log II: Lesson Plan

Project: How Shadows Change

Objectives: Students will measure and graph the length of a shadow over the course of a school day.

Introduction: Students can verify the results of the Shadow Explorer, Day experiment with this hands-on activity.

Lesson Plan:

1. Have students complete the Shadow Explorer, Day experiment.
2. Tell students that they can reproduce this experiment in the school yard by measuring their own shadows every hour during the school day.
3. Ask students what they think they will need to do this experiment. Make sure students realize that they will have to measure the same object's shadow, in the same place, each time.
4. Hand out the Explorer's Logs. Review the instructions with your class.
5. Divide the class into teams. Have each team decide who will cast the shadow, who will measure it, and who will make the graph.
6. As students measure the shadows, they may observe that the orientation of the shadows change as well as their length. Draw students' attention to the position of the sun in the sky and encourage them to speculate on why the orientation of the shadows is changing.
7. When students have completed their graphs, have them run the Shadow Explorer again. They can compare their results to the computer-generated results.

Sample follow-up activity:

Have students measure shadows at the same time each day for a week. Are the shadows the same length?

If your students are able to measure successfully with a measuring tape, they can record the shadows' lengths in inches or centimeters.

Explorer's Log II: How Shadows Change

Name: _____ Date: _____

Measure shadows. Find out how they change in length over the course of the day.

1. Choose someone on your team to cast a shadow.
2. Choose a place in the school yard to measure the first shadow at 10:00 a.m.
3. With chalk, mark where your friend should stand.
4. Mark the end of the shadow. Write the time next to the mark.
5. Repeat Step 4 at 11:00 a.m., 12:00 p.m., 1:00 p.m., and 2:00 p.m. Make sure that your friend stands in the same place.
6. Make a graph like the one in the Shadow Explorer to show the results.

HOW SHADOWS CHANGE

10:00 a.m.

11:00 a.m.

12:00 p.m.

1:00 p.m.

2:00 p.m.

At what time was the shadow shortest? _____

At what time was the shadow longest? _____

Do you think the shadow would be longer or shorter at 3:00 p.m.?

_____

Explorer's Log III: Lesson Plan

Project: Where Was the Sun?

Objectives: Students will recognize and successfully classify shadows cast by the morning, noon, and afternoon sun.

Introduction: Most children enjoy shadow play. Build on their enthusiasm and curiosity by encouraging them to observe and classify the ways in which shadows change throughout the school day.

Lesson Plan:

1. One sequence in the Shadows Change Tutorial shows how a girl's shadow changes over the course of a day. Review this with your class. Focus students' attention on the position of the sun and the direction of the shadow.

2. Make sure students understand that shadows always fall in the opposite direction of the light source. Since the sun rises in the east, morning shadows fall toward the west. Since the sun sets in the west, afternoon shadows fall toward the east.

3. Hand out the Explorer's Logs. Explain that students will classify the shadows by the time of day they think they were made.

4. After students have completed the Explorer's Logs, suggest that they choose an object they pass every day going to and from school and note the direction of its shadow.

Sample follow-up activity:

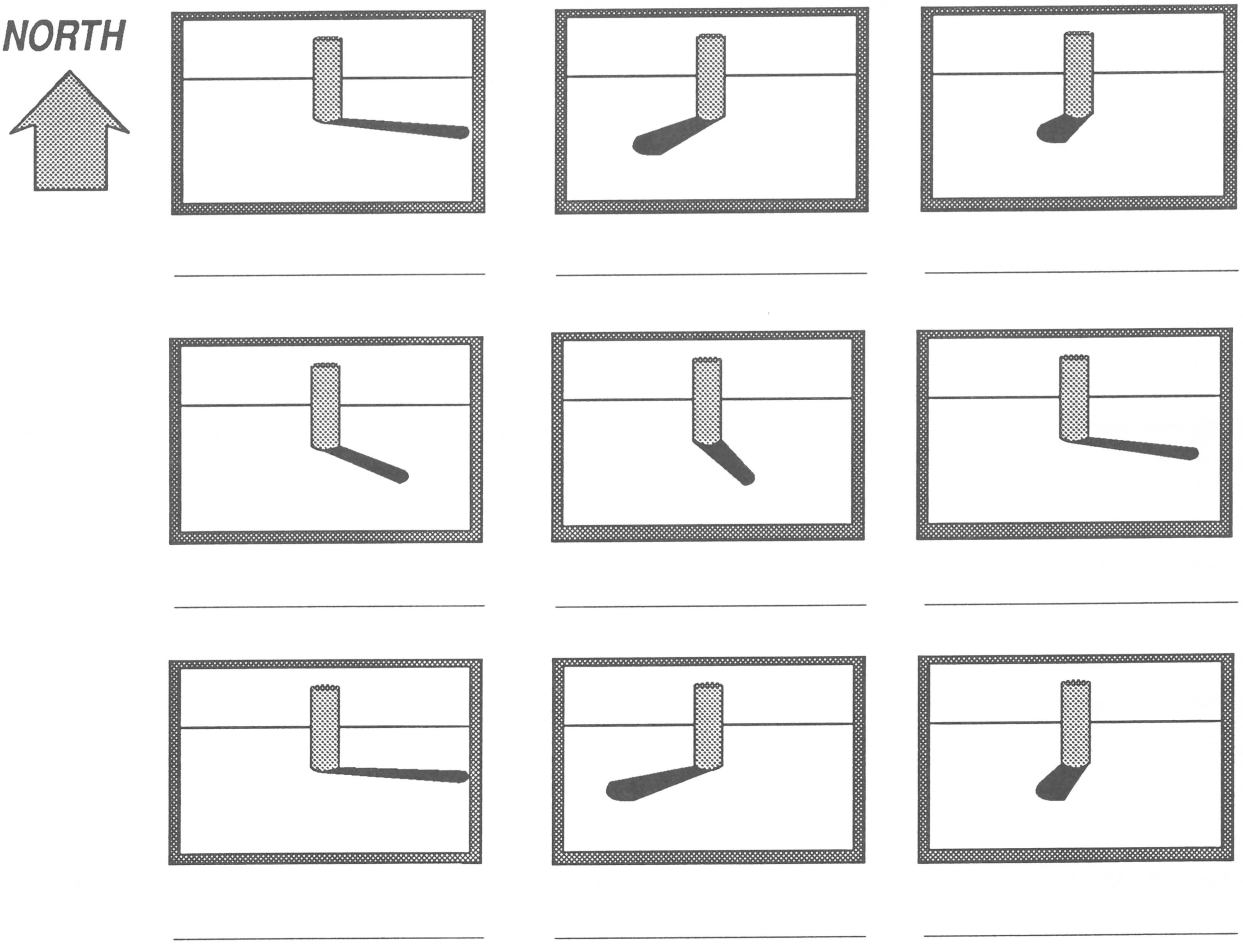
Create a series of pictures similar to those on the Explorer's Log showing what a rod's or a lamp post's morning, noon, and afternoon shadow would look like at the Equator, the North Pole, or the South Pole. Challenge students to figure out where on Earth they might see these shadows.

Explorer's Log III: Where Was the Sun?

Name: _____ Date: _____

Look at the pictures below. Some show morning shadows. Some show afternoon shadows.

Think about where the sun is in the morning and in the afternoon. Decide which shadows are morning shadows and which are afternoon shadows. Write morning or afternoon in the space under each picture.



Explorer's Log IV: Lesson Plan

Project: Shadow Plays

Objective: Students will learn about other cultures as they read about and create shadow puppets to use in shadow plays.

Introduction: Shadow plays are a traditional art form in many Asian cultures. Your students can learn more about shadows and the cultures that turn them to dramatic use as they make and stage their own shadow plays.

Lesson Plan:

You will probably want to set aside a period of time each day for several days to complete this project. A schedule is suggested below.

Day 1:

a. Introduce the lesson through a traditional shadow play, such as the Turkish tale "One Man's Horse," reproduced in the book *Quick Wits and Nimble Fingers*, by Bernice Wells Carlson.

b. Explain that the class can create its own shadow puppets and put on a shadow play.

Day 2:

a. Divide the class into teams. Each team will write a shadow play, make puppets, and stage a performance.

b. Have teams come up with an idea for a play and a list of characters (puppets) for the play.

Day 3:

Hand out the Explorer's Logs and cardboard, scissors, sticks,and glue for the puppets. Make sure that students understand the directions for making the puppets. Students can also make creative puppets on the computer with Scholastic SuperPrint ® II.

Day 4:

When students have finished their puppets and plays, set up a performance schedule and the projector. (Students can move their puppets over the base of an overhead projector, or in front of the light from a regular projector.)

Encourage students to practice moving puppets closer to and away from the light to change their size and appearance.

Some sample ideas for a shadow puppet show:

Shadow puppets are often used to tell traditional tales. If students have trouble thinking of an original story, suggest that they make puppets for a well-known fairy tale, such as Little Red Riding Hood .

Students could also create stories around some of the graphics in the *Science Explorers: Shadows* disk: The Day the Mouse Grew Bigger Than a Cat or Mystery at Shadow Beach, for example.

Explorer's Log IV: Shadow Plays

Name: _____ Date: _____

Work as a team. Think of a story for a play, then make shadow puppets to tell the story.

To make your shadow puppets:

1. Draw a picture of the character on cardboard.
2. Carefully cut out the puppet.
3. Tape the puppet to the end of a stick. Most of the stick will be a handle you use to move the puppet.
4. Practice moving the shadow puppets in front of the light.

The Play

The name of my team's play is _____

The play is about _____

The characters in the play are _____

_____

_____

This is the story (use extra paper if you need it):

_____

_____

_____

_____

_____

At-Home Science I

Project: Light Magic

Light goes in a straight line. But when it passes from the air through glass or water, it bends. This is called **refraction**. See what happens when light bends.

What You Will Need

- A glass
- Water
- A dinner knife

What to Do

1. Fill the glass half way with water.
2. Put the knife in the glass.
3. Hold the glass at eye level.
4. Look at the knife. Record what you see. You can write about it or draw pictures.

At-Home Science I: Light Magic

Name: _____ Date: _____

1. How did the knife look? _____
2. Do you think you would see similar results if you put a spoon or a straw in the water? _____
3. Do you think you would see similar results if you used soapy water or ginger ale instead of water? _____
4. Make your own experiment. Record what you did and what happened.

My Experiment

Experiment 1

Liquid used: _____

Object used: _____

Results: _____

Experiment 2

Liquid used: _____

Object used: _____

Results: _____

Experiment 3

Liquid used: _____

Object used: _____

Results: _____

At-Home Science II

Project: Telling Time with Shadows

Sundials are clocks that use shadows to show the time. You can make a simple sundial.

What You Will Need

- A large, square piece of cardboard, oaktag, or wood
- A paper towel tube
- Masking tape
- Four rocks to weigh down the sundial
- A marker
- A flat piece of ground or a windowsill that gets full sun
- A sunny day

What to Do

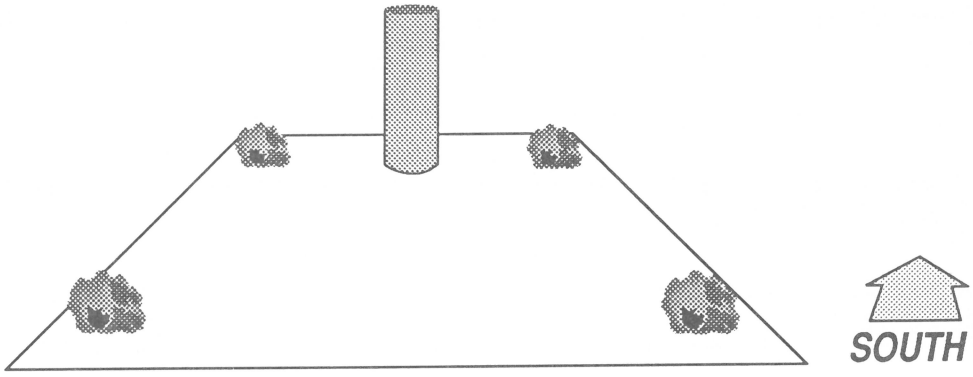
1. Make a sundial by taping the paper towel tube in the middle of one side of the cardboard. Look at the picture on your activity sheet for help.
2. Put the sundial in a flat place in the sun. The side with the tube should face south.
3. Use the rocks to weigh down the corners of the sun dial.
4. Starting early in the day, check the sundial every hour on the hour. Make a line where the shadow of the tube falls. Write the time at the end of the line.

At-Home Science II: Telling Time with Shadows

Name: _____ Date: _____

PART 1: Make your sundial.

Follow the directions. Your sundial should look something like the one in the picture.



PART 2: Use your sundial to tell time.

Put your sundial back outside. Make sure that the side with the tube is pointing south.

Use the sundial to tell the time. Then compare the sundial time to the time on a clock in your house.

Did the sundial tell the same time as the clock? _____

GLOSSARY

light Light is a form of energy.

light source A light source is an object that gives off light.

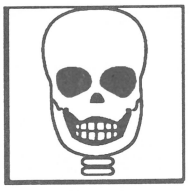
reflect Most objects stop, or reflect, light. The light bounces off them.

shadow A shadow is a dark area made when an object stops light.

surface A shadow must fall on a surface for you to see it.

SKELETONS

The human skeleton can be a great mystery to young children. It is also a subject that greatly interests them because they are so aware of and curious about their own growth. Since children can feel their own bones and see the bones of animals they eat, they can have direct experiences with skeletons. So why use a computer to study skeletons? These experiences are quite limited. So, too, are chances for direct work with skeletons in the classroom, since skeletons are expensive and not readily available to school children. *Science Explorers: Skeletons* gives students an "inside look" at their own skeletons and how they grow. As students learn about the function of skeletons and the form and function of key bones, they gain respect for this hidden but vital part of their bodies and the eating habits that can keep bones healthy.



Objectives

Students will:

- Identify the functions of a skeleton.
- Categorize animals by the type of skeleton they have.
- Understand that bones grow as people grow.
- Recognize that good nutrition is important for healthy bones.
- Conduct a controlled experiment to investigate how bones grow.
- Analyze the results of the experiment and draw conclusions.

To benefit most from the *Science Explorers: Skeletons* software, your students should be familiar with:

- Living versus nonliving things.
- Bones.
- Control of variables in scientific experimentation.

Content

The components of your *Science Explorers: Skeletons* disk are:

Exploration

Skeleton Explorer Children explore how bones grow through a structured experiment that lets them select a bone to study, measure that bone at four different points in the life cycle, and then draw conclusions about the age at which the bone stopped growing. As they do so, they gain insight into their own development into adulthood.

Tutorials

What is a Skeleton? The first Tutorial introduces students to basic facts about their own skeletons and how they compare to other members of the animal kingdom.

What Bones Do As children learn about the form and function of various bones, they are encouraged to find the bones on their own bodies and to consider how difficult certain activities would be if their bones were configured differently.

Ideas for Your Classroom

1. The What is a Skeleton? Tutorial asks students to guess how many bones they have. The correct choice is 206. One of the other choices, 103, is the number of bones in a giraffe's skeleton. Students might be intrigued to know that a mouse's skeleton has about as many bones as a giraffe's. In fact, most mammals have the same number of bones. Either share this information with your class, or enlist the aid of your school librarian in researching the number of bones in different mammalian skeletons so that students can discover the similarities for themselves.

2. The What is a Skeleton? Tutorial also introduces animals with hard parts on the inside and animals with hard parts on the outside. Students might be interested to know that some animals have hard parts both on the inside and the outside. One such animal, a turtle, is in the picture that appears on the last screens of the Tutorial. When you reach this screen, ask students whether they think the turtle has hard parts on the inside or outside. The *Eyewitness Books, Skeleton* (Alfred A. Knopf, New York, 1980) has an excellent picture of a turtle's skeleton.

3. Many depictions of skulls, including those in *Science Explorers: Skeletons*, show teeth. Make sure that your students understand that teeth are not bones. Point out that like bones, teeth are very hard (tooth enamel is the hardest substance in the body) and survive long after other tissues decay.

4. The What Bones Do Tutorial points out that fingers can bend because they are made up of many small bones. Stop at this part of the Tutorial. Ask if any of your students know what a joint is. Tell students that a joint is the place where two bones meet. Challenge students to find as many joints as they can on their own bodies. Followup with At-Home Science Activity II.

5. The Skeleton Explorer Exploration on this disk shows the rate of growth of different bones. Make sure that your students understand the following:

   • The program shows the bone growth of typical 8-, 13-, 18-, and 24-year-olds. Not everyone grows at the same rate. Use the hands-on experiment provided in Explorer's Log I to reinforce this point.

   • The graphs show *growth rate*, not actual bone size. Make sure students understand that these graphs let them compare how much the bones have grown, not their actual sizes. Similarly, students should recognize that the different bones represented (e.g., thigh bone; skull) are not the same size even though they may appear to be in the program. Again, the program shows the rate of growth for each bone, not its size. Reinforce this point by having students measure each other's thigh bones and back-bones and compare the differences in length of the two.

6. The Skeleton Explorer supports four separate investigations: Students can explore how the skull, thigh bone, backbone, or the bones of the hand grow. Divide your class into four teams. Have each team complete the exploration for one of the bones and record its results. Have the class discuss the results. Lead students to the conclusion that all of the bones stopped growing around age 18.

EXPLORER'S LOGS

Explorer's Log I: Lesson Plan

Project: Arm and Arm

Objectives: Students will formulate and test a hypothesis through a hands-on experiment.

Introduction: In this simple experiment, students predict whether everyone their age has the same length arm bones, then test their predictions by measuring their classmates' arms.

Lesson Plan:

1. Use the Skeleton Explorer to introduce students to how bones grow from childhood to adulthood.
2. Ask students whether they think every 6- or 8- or 10-year-old's bones are the same length. Discuss why this might or might not be true.
3. Distribute the Explorer's Logs. Explain that students can discover whether everyone the same age has the same length bones by measuring one another's arm bones.
4. Review the instructions with your class. Have a volunteer come to the front of the class so that you can demonstrate how to measure the bone (from the elbow joint to the wrist).
5. If your students do not know how to use a tape measure, have them cut string to the length of their friends' lower arms. Mount the strings on a chart, grouping them by length.
6. Tell students how many friends' arms they should measure. If you make a chart showing the arm length of everyone in the class, you will want to make sure that no one's arm is measured more than once.
7. When students have completed their experiments, discuss the results. Elicit suggestions for follow-up experiments they could conduct.

Some sample follow-up experiments:

Divide the class into 12 groups by date of birth. See if bone length varies less within each group than in the class as a whole.

Divide the class into two groups by sex. See if bone length varies less within each group than in the class as a whole.

Have students measure the forearms of some adults. Graph the results.

Explorer's Log I: Hands-on Experiment

Experiment: Arm and Arm

Do all kids the same age have the same length arm bones? Find out!

What You Will Need

- A tape measure or string
- A pencil or a pair of scissors
- Classmates

How to Set up the Experiment

1. Ask a classmate to stand with his or her arm held out. Your friend's palm should face up.
2. Hold the end of the tape measure or string against the inside of your friend's elbow.
3. Pull the tape measure or string down to your friend's wrist.
4. Record the measurement from the tape measure or cut the string.

Explorer's Log I: Arm and Arm

Name: _____ Date: _____

MY HYPOTHESIS

I think all of my classmates' arms _____ be the same length.
(will/will not)

MY EXPERIMENT

STEP 1: Set up the experiment. Follow the instructions under How to Set up the Experiment.

STEP 2: Record your results on this chart or on a chart in your classroom.

CLASSMATE	BONE LENGTH

MY RESULTS

Were all of your classmates' lower arms the same length? _____

Read your hypothesis. Did your observations support it? _____

Do you think you would see similar results if you measured a group of adults' arms? _____

How could you test this idea? _____

_____

Explorer's Log II: Lesson Plan

Project: How Many Bone-Healthy Foods Do You Eat Each Day?

Objectives: Students will record the number of servings of calcium-rich foods they eat in a day.

Introduction: Are students being nutritionally kind to their bones? They can find out by tracking the bone-healthy foods they eat in a day.

Lesson Plan:

1. Ask students if they can name any foods that build strong bones. Suggestions might include milk, cheese, and yogurt.

2. If appropriate, explain that foods that are especially good for bones are high in calcium. Students should eat such foods each day to assure that their bones stay healthy.

3. Hand out the Explorer's Logs.

4. Explain that keeping a "Food Diary" is a good way to find out whether or not you are eating as well as you should. Students will keep a Food Diary for one day. They will track how many servings of bone-healthy foods they eat.

5. Discuss your students' results. Did they eat as many bone-healthy foods as they thought? Fewer? More? Are any students going to try to add more calcium-rich foods to their diets?

Some sample follow-up activities:

Cut out pictures of calcium-rich foods from a magazine for a Bone-Healthy bulletin board .

Exercise, as well as nutrition, influences the health of bones. Have your school's health or physical education teacher talk to the class about the importance of getting regular exercise.

Explorer's Log II: How Many Bone-Healthy Foods Do You Eat Each Day?

Name: _____ Date: _____

Add a check mark each time you eat one of the foods on the list.

Broccoli	
Cheese	
Collard greens	
Corn muffins	
Ice cream	
Milk	
Orange	
Salmon (canned with bones)	
Sardines	
Spinach	
Yogurt	

How many servings of bone-healthy foods did you eat? _____

What is your favorite bone-healthy food? _____

Explorer's Log III: Lesson Plan

Project: Inside or Out?

Objectives: Students will apply observation and classification skills as they group animals by the kind of skeleton they have.

Introduction: Most children enjoy looking at pictures of animals. Give your students a scientific motivation for browsing through old issues of *Ranger Rick* or *National Geographic* with this activity, which challenges them to classify animals by the type of skeleton they have.

Lesson Plan:

1. Have students complete the What Is a Skeleton? Tutorial on the *Science Explorers: Skeletons* disk. The Tutorial introduces animals that have hard parts on the outside and hard parts on the inside.
2. Hand out the Explorer's Logs.
3. Explain that students can group, or classify, animals by the types of skeletons they have.
4. Provide old magazines, or ask that each student bring in magazines from home to use.
5. Have students cut out pictures of animals from the magazines and paste them in the appropriate column on their Explorer's Log worksheet. Animals with external skeletons include insects, spiders, mollusks (clams, snails), and crustaceans (lobsters; shrimp); those with internal skeletons include birds, reptiles, fish, and mammals.
6. As a follow-up discussion, ask students if they can see any other ways in which the animals with skeletons on the outside are alike (many will be sea creatures or insects). How about those with skeletons on the inside?

Sample follow-up activity:

Visit a natural history or trailside museum and observe the skeletons displayed there. Ask the children to count the number of bones in a few of the skeletons. Have them identify animals with skeletons on the outside and those with skeletons on the inside.

Explorer's Log III: Inside or Out?

Name: _____ Date: _____

Some animals have skeletons on the inside. Some have skeletons on the outside.
Find pictures of animals. Paste them in the right place below.

INSIDE	OUTSIDE

Explorer's Log IV: Lesson Plan

Project: Skeleton Tales

Objective: Students will recognize how authors and artists can use a symbol, such as a skeleton, to elicit emotion.

Introduction: Everyone loves a good scary tale, but what makes symbols such as skeletons, ghosts, or goblins so scary? And are they always scary? Discuss skeleton tales and poems with your class, then challenge students to write their own.

Lesson Plan:

1. Ask students what skeletons make them think of. How do they feel? Are skeletons scary? Funny?
2. Read scary and funny skeleton stories to your class. Talk about how differently the two stories made your students feel.
3. Explain that authors can use familiar *symbols* such as skeletons to make readers feel amused or scared.
4. Hand out the Explorer's Log. Explain that students can write or draw their own skeleton stories. First, they should decide whether they want to scare or amuse their readers. Then, they should write their stories.
5. Make a book of your class's stories and pictures. Give a copy to each student so that they can delight in one another's work!

Some sample skeleton stories:

"The Whistling Skeleton" in *The Whistling Skeleton, American Indian Tales of the Supernatural*, edited by John Bierhorst, Four Winds Press, New York (1982)

Funnybones , by Janet and Allan Ahlberg, Greenwillow Books, New York (1980)

The Soup Bone, by Tony Johnston, Harcourt Brace Jovanovich, San Diego (1990)

Bony Legs, by Joanna Cole, Scholastic Inc., New York (1986)

Explorer's Log IV: Skeleton Tales

Name: _____ Date: _____

Some skeleton stories are scary. Some are funny. Decide which your story will be, then write a story or draw a picture about skeletons.

My story will be _____
(scarry/funny)

My Story:

At-Home Science I

Project: Bone Shakes

Make a great tasting, bone-healthy milk shake. Then change the recipe. Create your own Bone Shake!

What You Will Need

- 1 cup of low-fat milk
- 1 8-ounce container of banana-strawberry yogurt
- 1/2 cup of crushed ice. Ask an adult to help you crush the ice.
- 1 banana broken into small pieces
- A blender or food processor
- Glasses
- An adult to help you

What to Do

Work with an adult:

1. Put all the ingredients in the blender or food processor.
2. Close the blender or food processor.
3. Blend the shake at high speed. Blend until all the ingredients are mixed together.
4. Pour the shake into the glasses.
5. Drink up! Yum!

At-Home Science I: Bone Shakes

Name: _____ Date: _____

PART 1: Make the Bone Shake. Follow the directions under What to Do.

PART 2: Think of other things you could put in the shake. For example: different fruits, honey, or a different flavor of yogurt.

PART 3: Write your own recipe for a Bone Shake. Make your shake. Enjoy!

My Recipe for a Bone Shake:

At-Home Science II

Project: Handy Bones

Look at your hands. Bend your fingers. The places where your fingers bend are called **joints**. Joints are where two bones meet.

Your joints are very handy! You could not bend your fingers without joints.

Trace a picture of your hand. Then draw the bones. Be sure to show the joints.

What You Will Need

- A pencil or crayons

What to Do

1. Trace your hand.
2. Draw bones in your hand.
3. Remember that two bones meet at a joint. Bend your fingers to see where the joints are and how to draw the bones.
4. Think about other parts of your body that bend. What are some of your other joints?

At-Home Science II: Handy Bones

Name: _____ Date: _____

Trace your hand here:

Think about other parts of your body that bend. Name some of your joints:

_____

_____

_____

GLOSSARY

backbone	The bones that run down the center of your back are called the backbone, or spine.
bone marrow	The soft, spongy part in the middle of a bone is called bone marrow. Some blood cells are made in the bone marrow.
bones	Bones are hard parts inside the body.
brain	The brain controls the rest of the body.
heart	The heart pumps blood through the body.
joint	The place where two bones meet is called a joint.
lungs	The lungs control the flow of air in and out of the body.
ribs	The bones in the chest that help protect the heart and other inside parts are called the ribs.
skeleton	All of a person's or animal's bones together are called a skeleton.
skull	The bones that protect the brain and give the face shape are called the skull.

RUNNING THE *SCIENCE EXPLORERS* SOFTWARE

This section of your Teacher's Handbook contains information on installing and using the *Science Explorers* software.

Making a Legal Copy

The disk in this package is an Archival disk. You will use this disk to make a Legal Copy of the program. You should use your Legal Copy for running the program and keep your Archival disk as a backup, in case anything happens to the Legal Copy. To make a Legal Copy:

1. Use any standard copy program or function to copy the entire contents of the Archival disk onto one blank disk. Use the Duplicate Disk function of your ProDOS® System Disk (Apple®), the DOS® DISKCOPY command (MS-DOS), or a commercial disk copying program. If you are using an Apple computer, be sure that your Legal Copy disk is notched on both sides. You will need to copy files onto both sides of the disk.

   NOTE: Be sure to copy the complete contents of the disk. Do not change any directory or filenames. If your computer displays a "write-protect" error, either the blank disk that you are using is not notched on the side that you are copying to, or a write-protect tab is covering the notch. To continue, you must either notch the disk or remove the write-protect tab from the existing notch.

2. Find the Legal Copy disk label included in this package. Use a soft-tipped marker to write the serial number from the enclosed Software License and Warranty Agreement in the space provided on the disk label.

3. Put the Legal Copy label on the copy that you created in Step 1. Be sure to put the label on Side 1 of the disk.

4. Store the Archival disk in a safe place with a copy of the Software License and Warranty Agreement.

If your Legal Copy becomes damaged or defective, first try recopying the program from the Archival disk to the Legal Copy disk. If the program still does not work, the Legal Copy disk medium itself may be defective. In this case, copy the Program from the Archival disk to another disk as a temporary Legal Copy. Then send the defective Legal Copy disk to Scholastic at the address below for a free replacement. When you receive the replacement, erase the temporary Legal Copy that you made.

If the Archival disk is damaged or defective, send it to Scholastic at the following address for a free replacement:

Scholastic Inc.
P.O. Box 7502
2391 E. McCarty St.
Jefferson City, MO 65102

In Canada:

Software from Scholastic
123 Newkirk Rd.
Richmond Hill, Ontario
Canada L4C 3G5

In Australia:

Ashton Scholastic Software
P.O. Box 579
Gusford, Australia, N.S.W. 2250

For a complete description of your rights and responsibilities in copying disks and using the program, see the Appendix in this manual and the Scholastic Software License and Warranty Agreement included in your *Science Explorers* package.

If You Have an Apple Computer...

Equipment You Will Need

- Apple IIe, IIc, or IIGS computer with a minimum of 128K of memory
- One disk drive
- A monitor or TV

Loading the Program

To load a *Science Explorers* program into your Apple Computer:

1. Insert the *Science Explorers* disk, Side 1 facing up, into the disk drive, and close the drive door.
2. Turn on the TV or monitor and the computer.
3. The computer will whir as the program loads. After the title screen appears, follow the instructions on the screen.

If You Have an IBM or TANDY Computer...

Equipment You Will Need

- An IBM® PC with color graphics card, Tandy® 1000, or true compatible computer with 256K of memory
- A double-sided disk drive
- A monitor or TV
- A DOS disk (version 2.1 or higher)

Loading the Program

To load a *Science Explorers* program into your IBM or Tandy computer:

1. Make sure your computer is turned off.
2. Turn on the TV or monitor.
3. Insert the DOS disk that came with your computer into Drive A. (Make sure that it is DOS 2.1 or higher.)
4. Turn on the computer. Prompts will appear on the screen telling you to enter the date and the time. Press Enter twice to skip these requests, or enter the date and the time and press Enter after each entry.
5. When the A> prompt appears on your screen, remove the DOS disk from the drive and insert the *Science Explorers* disk, Side 1 facing up, into the disk drive. Close the drive door.
6. Type **RUN** and then press Enter. The disk drive's power light will come on, indicating that the program is loading. After the title screen appears, follow the instructions on the screen.

Keys to Know

Clear, on-screen prompts guide your students effortlessly through the program. They need know only the following keys to use the *Science Explorers* software successfully:

→	move to the next screen
Space Bar or → and ←	highlight a choice
Enter/Return	confirm selected choice
?	get help
ESC	go back to the MAIN MENU from a Tutorial; go back to an earlier choice point in an Exploration or to the MAIN MENU from an Exploration
Y/N	answer yes or no to a question

APPENDIX: EDUCATOR'S GUIDE TO SOFTWARE COPYRIGHT POLICIES AND ETHICS

Scholastic believes educators are committed to protecting the intellectual property rights of software authors and publishers. At the same time, we have heard from many of you that copy protection code often inconveniences or impedes the legitimate use of our software.

Beginning August 1, 1989, we have taken the extraordinary step of publishing ALL new Scholastic software without any copy protection code and have even removed such code from our major products published before that date. For your further convenience and cost savings, we are also offering customized lab packs and site licenses for these products. We hope other publishers will soon follow our lead in saying to educators: "You trust us; we trust you."

The following policies and procedures have been developed to protect the copyrights of Scholastic and its authors while at the same time providing educators with the greatest possible convenience when using Scholastic software. These policies are consistent with the 1987 Statement on Software Copyright issued by the International Council for Computers in Education (ICCE). Relevant sections from that document and a model copyright policy from the New York City Board of Education are included for your reference.

Scholastic Software Copyright Policy

I. All Scholastic non-copy protected software packages consist of one Archival disk or set of disks, a Legal Copy label for each disk, and appropriate documentation. No back up disk(s) are included since the Archival disk(s) will be the back up(s) once Legal Copies are made.

II. As with all Scholastic software, non-copy-protected programs may be evaluated **FREE** for up to 30 days. During that time, the user MAY NOT make copies of any disks or documentation.

III. If the customer decides to purchase the software, the enclosed Software License and Warranty Agreement **MUST** be filled out and returned to Scholastic.

IV. The user **MUST** then use the Archival disk(s) to make one and only one Legal Copy of each Archival disk, for use at any one time.

V. Each Legal Copy disk **MUST** be labeled with the Scholastic Legal Copy label on which the user has entered the serial number provided on the Software License and Warranty Agreement.

VI. **ONLY** the Legal Copy may be used for educational purposes. The Archival disk **MUST** be stored, to be used again ONLY to recopy the program if the Legal Copy becomes defective.

VII. Under **NO** circumstances may the Legal Copy be used to make additional copies.

VIII. Schools needing multiple copies of a Scholastic program **MAY** either buy multiple Legal Copies in the form of Customized Lab Packs or purchase a Site License, which entitles them to make unlimited Legal Copies for use within a designated school.

IX. Under Scholastic's unique LIFETIME WARRANTY, if the Archival disk or the Legal Copy disk itself becomes defective, it may be returned to Scholastic for a free replacement. No questions asked. No shipping or handling charge. However, please note that to be eligible for this Warranty, the customer **MUST** have filled out and returned to Scholastic the Software License and Warranty Agreement.

X. Customers currently owning copy-protected versions of titles that will now be published without copy protection code are entitled to purchase non-copy- protected Legal Copies at low Customized Lab Pack prices. With such a purchase, the customer may also request the Archival disk(s) to be used to recopy the program, in case of Legal Copy disk failure.

XI. Scholastic programs are **NOT** to be loaded into more than one computer at a time, unless a Network License has been purchased from Scholastic. This restriction includes hard disk based networks, floppy disk based networks, and any and all multiloading devices.

XII. Many Scholastic programs have been designed to be RAM-resident so that they can be removed from computers equipped with only a single disk drive, freeing the disk drive for graphics, data, or spell-checking disks. These programs are **NOT** intended to be multiloaded. We believe multiloading to be an educationally, economically, and legally unsound practice. It wastes valuable instructional time, may limit access to program options that are not wholly RAM-resident, and often leads to premature disk failure. Moreover, it violates the copyrights of our authors and is inconsistent with the rest of our Software Copyright policies which prohibit unauthorized copying, whether the copy is a temporary one (in RAM) or a permanent one (on disk).

We believe the policies listed above will serve the best interests of our customers, our authors, and the field of educational computing.

Excerpts From The 1987 Statement on Software Copyright: An ICCE Policy Statement

The following recommendations and guidelines were approved by the Board of Directors of ICCE in January 1987, after having been developed by the 1986 ICCE Software Copyright Committee.

ICCE Suggested Software Use Guidelines

The 1976 U.S. Copyright Act and its 1980 Amendments remain vague in some areas of software use and its application to education. Where the law itself is vague, software licenses tend to be more specific. It is therefore imperative that educators read the software's copyright page and understand the licensing restrictions printed there. If these uses are not addressed, the following Guidelines are recommended. These Guidelines do not have the force of law, but they do represent the collected opinion on fair software use by nonprofit educational agencies from a variety of experts in the software copyright field.

Back-up Copy: The Copyright Act is clear in permitting the owner of software a back-up copy of the software to be held for use as an archival copy in the event the original disk fails to function. Such back-up copies are not to be used on a second computer at the same time the original is in use.

Multiple-loading: The Copyright Act is most unclear as it applies to loading the contents of one disk into multiple computers for use at the same time. In the absence of a license expressly permitting the user to load the contents of one disk into many computers for use at the same time, it is suggested that you not allow this activity to take place. The fact that you physically can do so is irrelevant. In an effort to make it easier for schools to buy software for each computer station, many software publishers offer lab packs and other quantity buying incentives. Contact individual publishers for details.

Local Area Network Software Use: It is suggested that before placing a software program on a local area network or disk-sharing system for use by multiple users at the same time, you obtain a written license agreement from the copyright holder giving you permission to do so. The fact that you are able to physically load the program on the network is, again, irrelevant. You should obtain a license permitting you to do so before you act.

Model District Policy on Software Copyright

The following model policy was developed by the ICCE Software Copyright Committee which recommended that school districts approve a policy along these or similar lines.

It is the intent of [district] to adhere to the provisions of copyright laws in the area of microcomputer software. It is also the intent of the district to comply with the license agreements and/or policy statements contained in the software packages used in the district. In circumstances where the interpretation of the copyright law is ambiguous, the district shall look to the applicable license agreement to determine appropriate use of the software [or the district will abide by their own approved software use guidelines].

We recognize that computer software piracy is a major problem for the industry and that violations of copyright laws contribute to higher costs and greater efforts to prevent copying and/or lessen incentives for the development of effective educational uses of microcomputers. Therefore, in an effort to discourage violation of copyright laws and to prevent such illegal activities:

1. The ethical and practical implications of software piracy will be taught to educators and school children in all schools in the district (e.g., covered in fifth grade social studies classes).

2. District employees will be informed that they are expected to adhere to section 117 of the 1976 Copyright Act as amended in 1980 governing the use of software (e.g., each building principal will devote one faculty meeting to the subject each year).

3. When permission is obtained from the copyright holder to use software on a disk-sharing system, efforts will be made to secure this software from copying.

4. Under no circumstances shall illegal copies of copyrighted software be made or used on school equipment.

5. [Name or job title] of this school district is designated as the only individual who may sign license agreements for software for schools in the district. Each school using licensed software should have a signed copy of the software agreement.

6. The principal at each school site is responsible for establishing practices which will enforce this district copyright policy at the school level.

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Scholastic recommends that school districts post a summary of the key points of their Copyright Policy wherever computers are in use in district buildings. For example, the New York City Board of Education prints the following information on a large poster that is posted conspicuously in every computer room, and next to computers that are available for staff and student use.

Copyright Law Restated

New York City Board of Education

Division of Computer Information Services

Office of Technical Assistance and Support

131 Livingston Street

Brooklyn, N.Y. 11201

SOFTWARE POLICY

1. Duplication of copyrighted software is prohibited, except for a single Archival copy not to be used simultaneously with the original.
2. School computers may not be used to illegally duplicate copyrighted software.
3. The school must contact software publishers to obtain written permission and procedures for making back-up and multiple copies, other than a single Archival back-up.
4. The school must obtain written permission from the publisher to download or network programs to other microcomputers.
5. The use of illegally duplicated software, however obtained, is prohibited in all Board of Education facilities.
6. The school must obtain the written permission of the publisher to use the original software and its back-up simultaneously.
7. The Principal of each school is responsible for establishing practices which will enforce this policy on the school level.
8. This policy should be posted conspicuously in every computer room, and next to computers that are available for staff and student use.
9. Violators of this software policy will be subject to disciplinary action.

These regulations are applicable to all Board of Education facilities.

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ISBN: 0-590-84058-4